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Supplementary Notes on the Erysiphaceae

By Ernest S. Salmon, F.L.S.

(Continued from page 22)

PODOSPHAERA OXYACANTHAE (DC.) de Bary. (Monograph, p. 29)

Syn. add: P. clandestina Lév. var. *ramulicola* Thüm. Bull. Soc. Imp. Nat. Mosc. 56^2: 126. 1882.

*Exsicc.** *add:* Shear, New York Fungi, 138 (in herb. Jaczewski),

Distrib. add: Asia; Siberia (Minussinsk).

Hosts, add: Crataegus nigra (40), *C. sanguinea, C. tanacetifolius* (80), *Prunus Persica* (2*) (40*), *Vaccinium Vitis-Idaea.*

Professor N. Martianoff has kindly sent me a specimen of the *Podosphaera* on which Thümen founded his "*P. clandestina* var. *ramulicola.*" Thümen gave the following diagnosis: "Peritheciis dense aggregatis, numerosissimis, pulviniformibus; mycelio candido, non evanido; ascis sporisque typicis. In ramulis vivis *Crataegi sanguineae* Pall. in sylvis prope Minussinsk." The specimen is remarkable for the manner in which the perithecia are densely compacted in extended patches along the branch of the *Crataegus.* Due probably to this dense crowding, causing lateral pressure, some of the perithecia are oblong-pyriform in shape. The structure of the perithecium, the asci and spores are normal for the species. The perithecia are not fully mature, but the apices of the appendages show the beginning of the characteristic branching of *P. oxyacanthae.* On the whole, I consider that Thümen's plant, being characterized merely by the crowded habit of the perithecia is to be regarded as only a form, and not as a true variety, of *P. oxyacanthae.*

Examples of *P. oxyacanthae* with quite the same habit as that of the "var. *ramulicola*" are seen in the specimen in Ellis and Everhart's N. Amer. Fungi, no. 2335, "on leaves of *Crataegus,*

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* Only those exsiccati are quoted which have been personally examined, and unless prefixed by an asterisk, or followed by information as to the source, all the numbers refer to the copies in the Kew Herbarium. Those distinguished by an asterisk are to be found in the herbarium of the British Museum (Natural History), London.

London, Canada, July, 1889 (J. Dearness)." These specimens show further the manner in which this form passes gradually into the type: perithecia with a normal habit occur on both sides of the leaves; on the under side of the leaves about the midrib, we find perithecia congregated in patches with persistent mycelium; and on the branches themselves the perithecia are crowded into dense patches among persistent mycelium.

Other examples of *P. oxyacanthae* occur in the United States —on *Crataegus punctata* and other species of *Crataegus*, on *Prunus Virginiana*, etc.—in which the perithecia are densely crowded along the midrib of the leaf (although the aggregation is not quite so marked as in Thümen's plant), and in these cases it is to be noted that the mycelium is subpersistent in exactly the same manner as in "var. *ramulicola*." It may be observed that among the forms of *Sphaerotheca humuli* the plant on *Neillia opulifolia*, etc. (see monograph, p. 63), stands in the same relation to the type as the "var. *ramulicola*" does not typical *P. oxyacanthae*.

In a specimen of *P. oxyacanthae* on *Crataegus oxyacantha* from "Belluno, Italy (Speg. 7/10 '78)," the spores according to drawings by Spegazzini which are reproduced at *Pl. 9, f. 22*,* are very strongly curved. In the specimen sent to me I was unfortunately unable to find any mature perithecia containing spores. The almost allantoid shape of the spores shown in Spegazzini's drawings is certainly remarkable; although in *P. oxyacanthae* var. *tridactyla* I have observed that the spores are sometimes slightly curved, and in *Erysiphe trina* Harkn., the curving is more frequent and more pronounced.

In another specimen of *Spegazzini's* collecting, from the same locality and on the same host, the appendages reach from 2½ to nearly 3 times the diameter of the perithecium. Such cases as these show clearly the impossibility of keeping the *P. myrtillina* of Kunze and Schmidt apart from *P. oxyacanthae*. (See monograph, p. 32.)

Bailey (2**) refers the fungus known commonly in the United States as the "peach mildew" to the present species, and observes: "the peach mildew (*P. oxyacanthae*) has been serious in various parts of western New York the past season. In the Niagara belt it has attacked Crawfords, and upon Seneca lake I have seen a peach known as the Denton almost ruined by it. The fungus generally appears when the peach is very small, as irregular mouldy or frost-like patches upon the surface. Later on, these patches become brown and hard, and the peach cracks. The same mildew also attacks the leaves, covering them with a whitish mould-like substance and causing them to become hard and curled."

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* The plates will appear with the final part in the BULLETIN for March.

Waite (Ann. Rep. Dept. Agric. for 1888 : 353. 1889) also observes that *P. oxyacanthae* causes considerable harm to the peach. Other writers, however, state that the peach mildew is *Sphaerotheca pannosa* (see p. 92).

P. OXYACANTHAE TRIDACTYLA (Wallr.) Salm. (Monograph, p. 36)

Hosts, add: Prunus Grayana, Pyrus Aucuparia (18).

Distrib. add: Tasmania (62).

Professor Shotaro Hori has sent me the present plant on the leaves of *Prunus Grayana* from Mt. Isukuba, Japan (coll. T. Nishida, Nov. 1900). This is the second record of the var. *tridactyla* from Japan, the fungus in the first case having occurred on *Prunus communis*. The present form on *P. Grayana*, although clearly referable to the var. *tridactyla*, slightly approaches the type in the tendency shown by the appendages of many of the perithecia to diverge somewhat instead of being erect. The apex of the appendages frequently shows the elongated primary branches characteristic of the var. *tridactyla* (see monograph, pp. 110, 111).

Bubak has recorded (9) the occurrence in Bohemia of "*P. tridactyla* De By." on the leaves of *Potentilla reptans*. Dr. Bubak informed me that the specimens have unfortunately been lost. It is most unlikely that the *Potentilla* was here really serving as a host-plant; probably, if the fungus was correctly determined, the perithecia of the *Podosphaera* were merely accidentally adhering to the *Potentilla* leaves (see monograph, p. 23, for similar cases).

P. BIUNCINATA Cooke & Peck. (Monograph, p. 39)

Exsicc. add: * Rehm, Ascomycet. 1100; Shear, New York Fungi 139 (in herb. Jaczewski).

P. LEUCOTRICHA (Ell. & Everh.) Salm. (Monograph, p. 40)

Ref. add: Sphaerotheca mali Burr.; Lüstner, Mitteil. über Obst und Gartenbau, **16** : 82 *pl.* 1901.

Distrib. add: N. America, U. S., New York (57).

Hosts, add: Pyrus communis.

Lüstner (42) gives an interesting account, accompanied by good figures, of the occurrence of the present species on both the leaves and fruit of pear trees in a nursery at Geisenheim, Germany, where it was the cause of some injury to the trees. Hitherto *P. leucotricha* has been known only on the apple in Europe and the United States, and on *Pyrus Sieboldi* in Japan.

P. leucotricha appears to be on the increase in Germany, where there have been numerous reports of late of serious injury caused by this fungus to apple orchards. Bordeaux mixture has been found to be ineffectual as a fungicide, but sulphur is stated to give good results (see Wehmer 86, 87, and Magnus 44, 45, 46). Cutting off and burning the affected shoots is, however, a far better method of dealing with the disease than spraying, as, unless this method is adopted, the present fungus, like the "peach mildew" (see p. 92), is liable to recur year after year on the same trees. (See Schlichting 72 *).

The mildew that frequently attacks the young shoots of apple trees in England and in severe cases spreads on to the apples themselves, covering them with a white powdery film, in all probability belongs to the present species, although up to the present I have not seen any perithecia from a British locality.

Goethe (21) has recorded the occurrence of *Sphaerotheca pannosa* on apple trees at Geisenheim in Germany; according to specimens (now in the Kew Herbarium), however, sent to me by Dr. Lüstner, the fungus in question is *P. leucotricha.*

Despeissis (15*) records a fungus as the "Apple and Pear Powdery Mildew (*Podosphaera* sp.)," from western Australia, and remarks: "This disease, which from its appearance at a later stage, is also known as 'Fire Blight,' is more widespread in some seasons than others. It affects the young shoots of pear and apple trees and stunts their growth."

SPHAEROTHECA HUMULI (DC.) Burr. (Monograph, p. 45)

Syn. add: Torula epilobii Corda, Ic. Fung. **4**: 23. *pl.* 6. *f.* 75. 1840.

Oospora epilobii (Cord.) Sacc. & Vogl.; Sacc. Syll. Fung. **4**: 12. 1886.

Oidium fragariae Harz. in Bot. Centralbl. **32**: 314. 1887; Sacc. Syll. Fung. **10**: 520. 1892.

Exsicc. add: *Rehm. Ascomycet. 1349 a; Shear, New York Fungi, 136 (in herb. Jaczewski); Krieg. Fung. saxon. 1212, 1215 (in herb. Jaczewski).

Distrib. add: Europe: Bulgaria (10), Faeröe Islands (63).

Asia: Turkey (Bithynia, in reg. infer. montis Keschisch-dagh (Olympi), supra Brussa (2–300 m. s. m.). 1899. (J. Bornmüller, Iter Anatol. tert. no. 2065)!

Siberia; Poseka, Lusino (Sacc. Malpighia, **10**: 269. 1896).

Hosts, add: Alchemilla Helvetica, Epilobium obscurum (40), *Fragaria* sp. (cult.), *Geranium dissectum, Geum rivale, Potentilla collina* (40), *P. Sibbaldi* (40), *Rubus Idaeus* (Burrill; Ell. & Everh., N. Amer. Pyren. 6), *R. villosus, Tragopogon pratensis* (40), *Veronica Virginica Sibirica.*

Among the specimens of Erysiphaceae sent to me by Professor Kingo Miyabe, there occurs a *Sphaerotheca* on *Veronica* which must be referred to the *S. humuli* type. This occurrence is specially interesting on account of the fact that up to the present only the var. *fuliginea* of *S. humuli* has been known on species of *Veronica.* In Europe, Siberia and Asia, and North America *S. humuli fuliginea* occurs on *Veronica Virginica* (Rab.-Wint. Fung. Eur. 3657, from Missouri, U. S. A., *sub S. Castagnei* Lév.); on *V. spicata* (Roumeg. Fung. gall. exsicc. 2741, from Rouen, France, *sub S. Castagnei* Lév.); on *V. longifolia* (Syd. Myc. March. 1239, from Berlin, Germany, *sub S. Castagnei* Lév.), (Rab. Fung. Eur. 2026, from Saxony, *sub Erysiphe Castagnei* forma *veronicarum*), (de Thüm. Myc. univ. 1839, from Minnussinsk, Siberia, occid., *sub S. Castagnei* Lév.). In all the above-cited examples the fungus is typical *S. humuli fuliginea,* with perithecia measuring from 60–70 μ in diameter, and the cells of the outer perithecial wall, averaging 25 μ wide. The Japanese plant, of which two examples have been sent—"on the skins of *Veronica Virginica* var. *Sibirica*, Sapporo, Sept. 17, 1890, coll. E. Tokubuchi," and "on the leaves of *V. Sibirica*, Sapporo, Oct. 10, 1894, coll. N. Hiratsuka," belongs, as mentioned above, to the *S. humuli* type. The perithecia measure about 100 μ in diameter, and the cells of the outer wall average 15 μ wide. *V. Sibirica* is treated by most botanists as synonymous with *V. Virginica.*

Corda's figures of his "*Torula epilobii*" well represent the conidial (*Oidium*) stage of *S. humuli*, which occurs not uncommonly on species of *Epilobium*. Saccardo has transferred Corda's *Torula epilobii* to the genus *Oospora*—evidently by a slip, as in the key to the genera of the *Hyphomycetes* (Saccardo, Syll. **4**: 3) *Oospora* is placed in the section comprising genera which contain "species saprophilae," and Corda expressly described his plant as parasitic.

During the season 1900 *S. humuli* was the cause of the destruction of the strawberry crop in many districts of England. The fungus, in its conidial stage—to which the name *Oidium fragariae* Harz has been given on the Continent—spreads from the leaves of the strawberry plant to the fruit, investing it with a white powder, and ruining it for market purposes. I have already (**71** and **72**) given an account of this outbreak of the "strawberry mildew," with notes as to the varieties which are most attacked and those which appear to be immune. The fungicide which was found to be most effective was prepared in the following manner: one ounce of carbonate of copper is mixed with 5 ounces of carbonate of ammonia, and dissolved in a quart of hot water; when dissolved 16 gallons of water are added. The plants should be sprayed repeatedly with this fungicide as soon as any trace of the mildew appears on the leaves, for it has been found that once the fungus is in full vigor on the fruit nothing can be done to save the crop.

Professor McAlpine reports from Australia that during 1901 strawberry plants were very severely attacked by a "strawberry *Oidium*," and that although the strawberry plants were carefully examined at the end of winter, no perithecial stage could be found.

The disease known to hop-farmers under the name of "red mould" is probably caused, as Hammond (**24**) has pointed out, by *S. humuli.* In hops attacked by "red mould" the bracts of the cones lose their normal bright yellowish-green color, and become tinged reddish-brown. Other writers, however, have stated that this reddish color is due to the incipient death of cells caused by certain atmospheric conditions, excessive dryness of soil, etc., and consider that the fact of the red color being sometimes present in hops which show no trace of the *Sphaerotheca* affords conclusive proof that "red mould" is not caused by the present fungus. I have, however, found in studying the "strawberry mildew" disease, caused by *S. humuli*, that strawberry leaves may commonly be found (after the disease has been running for some time) on which no trace of any fungus is to be found, yet which bear reddish discolored patches on the under surface. Continuous observation of diseased strawberry plants showed that these reddish patches were composed of epidermal cells which had been killed or whose contents had been modified, by the haustoria of *S. humuli*, and that the mycelium after causing this injury, had completely disappeared.

S. HUMULI FULIGINEA (Schlecht.) Salm. (Monograph, p. 49)

Syn. add: S. microcarpa Hazslinszky, M. Tud. Akad. Math. ès Természettud. Közleményck, **15**: 20. 1878. *S. phtheirospermi* P. Henn. & Shirai, Engler's Bot. Jahrb. **29**: 147. 1900. *S. fuscata* (B. & C.) Serbinov. Scripta Bot. Univ. Petropol. **18**: (16). 1901.

Exsicc. add: Krieger, Fung. saxon. 1210, 1211, 1213, 1214, (in herb. Jaczewski); Rehm, Ascomycet. 1349b; Shear, New York Fungi, 137 (in herb. Jaczewski).

Distrib. add: Europe, Bulgaria (10); Asia, Siberia, Yeniseisk, "flum. Yenisei inter 58° et 71°" (A. Kitmanoff).

Hosts, add: Arabis alpina, Bidens pilosa, Calamintha umbrosa, Clerodendron trichotomum, Coreopsis trichosperma (84), *Crepis virens, Impatiens Balsamina, Microseris senella, Phtheirospermum Chinense, Saxifraga punctata, Senecio Cineraria* (cult.), *S. Muhlenbergii.*

Hosts recorded for the aggregate: "*S. Castagnei* Lév." *add: Arctium minus* (19), *Bupleurum linearifolium* (59), *Calendula fulgens* (40), *Centaurea Babylonica* (59), *Cnicus arvensis* (65), *Plantago major* (80), *Veronica Chamaedrys* (76), *V. orientalis* (40).

Hazslinszky described in 1878 (**28**) a *Sphaerotheca* from Hungary as a new species under the name *S. microcarpa*, with the following diagnosis (I am indebted to Professor A. Mágócsy-Dietz for the translation of the Hungarian): "*S. microcarpa* nov. spec. Mycelium spinnwebartig, weiss. Perithecien zerstreut, sehr winzig, kugelig, endlich schwarz, mit einem kugligen Ascus. Die Wand des Ascus ist sehr dünn auf der sich papillös erhebenden Spitze. Unter dem Ascus, entgegengesetzt dem Scheitel, sitzt ein Discus mit kuchenartiger Gestalt, von welchem der Ascus sich schwer loslöst. In dem Ascus befinden sich 6–8 elliptische Sporen. Die Anhängsel sind weiss, unregelmässig und bestehen aus ungetheilten Fäden.—Wächst auf der unteren Fläche der Blätter von *Xanthium spinosum* im Comitate Ung (Ungarn). Es ist leicht möglich, dass der Pilz nicht selten ist und überall die Wirthspflanze begleitet." From the description given it is evident that the fungus is *S. humuli fuliginea*, which is found not uncommonly on *Xanthium spinosum*, *X. strumarum*, *X. Canadense*, *X. Italicum*, etc.

S. phtheirospermi P. Henn. & Shirai, Engler's Bot. Jahrb. **29**: 147. 1900, on *Phtheirospermum Chinense*, Mt. Takao, Prov. Musashi, Japan (Kusano, no. 130, Nov. 8, 1899), is typical *S. humuli fuliginea*, quite similar in all respects to European examples on *Taraxacum officinale*, and on a number of hosts belonging to the Scrophulariaceae (*Bartsia*, *Euphrasia*, *Melampyrum*, *Pedicularis*, etc.). The specimen, labelled as above, of "*S. phtheirospermi*" (now in the Kew Herbarium) kindly sent to me by Dr. Hennings, shows perithecia 60–90 μ in diam., with the cells of the outer wall large and distinct, and measuring 15–30 μ wide; the appendages are few and distinct; the ascus is broadly ovoid to subglobose, and measures 50–60 x 45–50 μ. *S. humuli* var. *fuliginea* occurs not uncommonly on a number of plants in Japan (see "Erysiphaceae of Japan" (**68**, p. 446)).

Serbinov (**76**) has transferred the *Erysiphe fuscata* of Berk. & Curt. (Grevillea, **4**: 159. 1876), to the genus *Sphaerotheca*, giving the plant the name *S. fuscata* (B. & C.) Serbin. Serbinov, however, has overlooked the fact that, as pointed out by Burrill (Ellis and Everhart's N. Amer. Pyren. 8), and at p. 51 of my monograph, "*E. fuscata*" is identical with *S. humuli fuliginea.*

The fungus recorded as *S. Castagnei* by Rabenhorst (**59**) on *Euphorbia* from Persia, proves to be *Erysiphe taurica* Lév.; that recorded (*l. c.*) under the same on *Hibiscus esculentus* bears, according to specimens from Rabenhorst's herbarium, no perithecia, but, from the mycelial characters shown, probably also belongs to *E. taurica.*

The *S. Castagnei* recorded by Magnus (Bericht. des naturwiss.-med. Ver. Innsbruck, **24** : 6. 1898, on *Caltha palustris*, proves to be a small form of *Erysiphe polygoni* DC.

The fungus recorded as *S. humuli* Schroet., on *Plantago major*, by Feltgen (**18**), proves from specimens sent to be *E. cichoracearum* DC.; and that recorded (*l. c.*) under the same name as occurring on "*Mentha longifolia*" proves from specimens sent to be *S. humuli fuliginea* on *Veronica longifolia.*

The plants recorded as *S. Castagnei* Lév. *p.p.* Burr. (= *S. humuli fuliginea*) on *Shepherdia argentea* and *Collomia linearis* from Wyoming, by Griffiths (Bull. Torrey Club, **26**: 142, 143. 1899), prove from specimens sent by the writer to belong to *S. humuli* (DC.) Burr. They are small forms of the species—the perithecia in the example on *Collomia*, measuring 75–100 μ in diam., and in that on *Shepherdia* 90–110 μ—with quite the general appearance of the var. *fuliginea*, but with the cellular structure of the perithecium characteristic of the *S. humuli* type.

S. PANNOSA (Wallr.) Lév. (Monograph, p. 65)

Exsicc. add: *Linhart, Fung. hungar. 354.

Distrib. add Europe, Austria-Hungary; Australasia, Tasmania (62).

Hosts, add: Rosa Eglanteria (40), *R. fragrans* (40).

Spegazzini records (**79**), *Oidium leucoconium* Desm. as occurring "ad folia viva *Rosarum* cultarum vulgatum in tota Republica Argentina et in Montevideo, per ann., 1880–1897." If correctly determined, this refers to *S. pannosa*, as *Oidium leucoconium* is the conidial stage of this species; it may be noted, however, that in North America a peculiar form of *S. humuli* occurring on roses has commonly been mistaken for *S. pannosa* (see monograph, p. 68).

The fungus reported by Goethe (**21**) as *S. pannosa*, occurring on apple trees in Germany, proves to be *Podosphaera leucotricha.* In the case of Cavara's record, also mentioned by Magnus (46), of

S. pannosa on apple trees, the same mistake in identification has in all probability been made.

The fungus known as the "peach mildew" is apparently *S. pannosa*, although some writers, *e. g.*, Waite and Bailey refer it to *Podosphaera oxyacanthae* (see p. 85). This doubt as to the specific identity of the mildew on the peach is due probably to the fact that—as in the case of *Podosphaera leucotricha* on the apple—the conidial stage, which causes the injury, is usually the only stage in which the fungus occurs. I have, however, seen in a European example, the pannose mycelium of the perithecial stage of *S. pannosa* on the stem of a peach tree.

Smith (Journn. Mycol. **7**: 90, 91. 1892, and Selby (**75***) both refer to the "peach mildew" as "*S. pannosa*," and give the following accounts of the injury caused by it. Smith observes: "This mildew usually attacks the leaves and young stems. On the latter it forms a dense, felt-like, persistent hyphae-complex which is first white and afterwards a dirty gray, the epidermis being cracked open and destroyed or much injured and a thick brown layer of cork being formed under the mycelial patches. The mildew produces conidia in abundance, but perithecia have not been found, although the search has been continued into winter." Smith noticed that the disease recurred year after year upon the same individual peach trees, whilst the surrounding trees were entirely free, and remarks: "The fungus has been found on the unfolding shoots of a tree so early in the spring and to such an extent as to make it almost certain that it had wintered over in the form of perennial mycelium. From other trees fresh-looking mycelium has been taken in mid-winter, and I have no doubt as to its perennial nature." It was found also that "peach trees with gland-bearing leaves remained free from mildew, while mildewed trees bore leaves destitute of glands." Smith remarks: "It would seem, therefore, as though peach trees of the type bearing glandular leaves are more resistant to this mildew than other varieties, but whether this will hold good for all localities and all varieties remains to be seen."

Selby reports the "peach mildew" as attacking the fruit as well as injuring the leaves and twigs, and observes: "Upon the fruit, this mildew causes large, light-colored spots, with an enormous multiplication of epidermal hairs or fuzz of the peach. Under the affected spots there is a hardening of the fruit and the consequent effect upon the quality is less marked though quite similar to that produced by the scab (*Cladosorium carpophilum* Thüm.). To cut and burn affected shoots is recommended as a preventative measure for mildew. Spraying is unlikely to yield favorable results."

Halsted (23*), in mentioning the fungus on diseases observed on fruit trees during 1894 at the New Jersey Agricultural Experiment Station, remarks: "*S. pannosa* has interfered with the growth of the young twigs of peach trees, coating them over in much the same manner that *S. mors-uvae* does the stems of the gooseberry."

S. MORS-UVAE (Schwein.) Berk. & Curt. (Monograph, p. 70)

Distrib. add: Europe, in a garden, Ballymena, County Antrim, Ireland (? introduced). N. America, U. S., Utah (73), Indiana (84).

The appearance in 1900 of the "American gooseberry-mildew," *S. mors-uvae*, up to that time known only from the United States, in Ireland has already been noted (51) (71 and 72). In the present year (1901) the disease has reappeared in the same garden at Ballymena, County Antrim, and the gardener there has reported to me the following facts: "The disease this year was even more extensive than last; and the young wood seems more affected at this time of year (August) than it did last year. I have not heard of any neighboring gardens being affected as yet. Some varieties of gooseberries are far more subject to the disease than others. The "large green" gooseberry is not affected, while the "small green" is very much affected, although both berries are smooth. The "amber" is by far the worst of any. Some varieties of "red" seem proof against the fungus, while others are nearly as susceptible as the "amber"; the "smooth red" is the worst.

Magnus is of the opinion that the fungus has been introduced into Ireland from America, and suggests (47) that imported gooseberries bearing the fungus may have been the source of infection. This, however, cannot have been the case, as the authorities at the

Customs House (London), inform me that no importation of gooseberries into Britain from the United States occurs. I have learned, however, through Mr. F. W. Moore, of the Royal Botanic Gardens, Dublin, that two firms of florists in Ireland some years ago imported gooseberry plants from the United States. It is certainly possible that by this means the disease may have been introduced from America. But, on the other hand, we must remember that Ireland possesses some indigenous plants found elsewhere only in North America. Also, as I have already pointed out (monograph, p. 72), in the fungus known as *Sphaerotheca euphorbiae* (Cast.), which is not uncommon on the Continent on species of *Euphorbia*, appears to be morphologically indistinguishable from *S. mors-uvae.*

It may be noted here that De Wildeman (**16**) has lately enumerated *S. mors-uvae* among the Erysiphaceae of Belgium. The record runs, "sine loco (Em. Marchal)"; up to the present I have not been able to obtain any information about this Belgian record.

It may be well here to draw attention to the serious economic danger with which European fruit farmers will be confronted if this "American gooseberry mildew" is allowed to establish itself in Europe. The practical aspect of the subject is ably dealt with by Beach (2**), in Bull. N. Y. Agric. Exper. Station, 114, where a full and well-illustrated account of the cultivation of gooseberries in the United States is given. It is here remarked: "The one great hindrance to the cultivation of European gooseberries in this country is their susceptibility to attacks of the mildew, *Sphaerotheca mors-uvae.* From the standpoint of the American fruit-grower gooseberries falls into two classes, those which suffer from the mildew and those which do not. The former class includes all European varieties and their American grown seedlings, or in other words, all varieties of the species *Ribes Grossularia* L. The latter class includes the cultivated varieties of the native American species *oxyacanthoides* L. and *Cynosbati* L., and some hybrids between them and the European species. * * * On account of their liability to serious attacks of mildew, European gooseberries should not be planted for commercial purposes, except by those who are prepared to contend with that disease." We may infer from these observations that if the fungus were to become widespread in Europe, the whole gooseberry crop would be seriously affected. Beach (*l. c.*) observes: "spraying to prevent mildew should begin as soon as the buds begin to unfold, using one ounce of potassium sulphide for every two gallons of water. Repeat the applications at intervals of ten days till the fruit is nearly ready to market. Should frequent heavy rains occur spray more frequently. Be sure the spray reaches all the foliage, especially on the inner and under parts of the bush which are usually slighted. The use of Bordeaux mixture is objectionable because it is apt to stick to the fruit and injure its market value, even though the application be made several weeks before the crop is marketed."

A valuable account, describing the mode of attack, best methods of prevention, etc., has also been given by Halsted (23).

S. euphorbiae (Cast.) Salm.

Botrytis euphorbiae Cast. Supp. Cat. Pl. Mars. 81. 1851. (For further synonymy *cf.* Monograph, p. 71.)

Syn. add: Oidium euphorbiae Thüm. mss. in herb.

Exsicc. add: *Rehm. Ascomycet. 1049.

Hosts, add: Euphorbia Cyparissias palustris.

The specimen in the Kew Herbarium, ex herb de Thümen, named "*Oidium euphorbiae* Thüm. mss. on *Euphorbia dulcis*, Austria inf., Krems, 7.71" belongs to the present species.

S. LANESTRIS Harkn. (Monograph, p. 74)

Syn. S. Kusanoi P. Henn. & Shirai, Engler's Bot. Jahrb. **29**: 145. 1900.

Hosts, add: Quercus glandulifera.

Distrib. add: Japan; Prov. Kozuké, Mt. Myogi (Kusano, Nov. 4, 1899). Mt. Tsukuba (T. Nishida, Nov. 2, 1900)!

Hennings and Shirai (31) have lately described a *Sphaerotheca* from Japan as a new species under the name of *S. Kusanoi.* Dr. Hennings has kindly sent me a specimen of this fungus (now in the Kew Herbarium) labeled "on *Quercus glandulifera*, Prov. Kozuké, Mt. Myogi (Kusano, no. 123, Nov. 4, 1899)." This fungus is, in my opinion, *S. lanestris* in a slightly immature condition. The authors remark of *S. Kusanoi:* "Die Art ist mit *S. lanestris* Harkn. verwandt, aber duch das völlig farblose Mycel, durch die pfriemlichen vom Mycel völlig getrennten Anhängsel, durch die am Scheitel nicht verdickten, 5–6 Sporen enthaltenden Asken, sowie durch die mit einem Tropfen versehenen, im Innern nicht gekörnelten Sporen gut verschieden." Of the character here given, the completely colorless mycelium would if constant be the most important, as separating the plant from *S. lanestris*, but this distinctive character certainly does not hold good. Although the specimen is undoubtedly for the most part immature, as is shown by the fact that the ascus of most of the perithecia is found, on being pressed out, to be still completely enveloped in the separating inner wall of the perithecium. But even in this stage some of the hyphae of the mycelium, intermixed with colorless ones, show a decided brown color under the microscope. Moreover, in one corner of a leaf in the specimen sent, a small patch of mycelium has turned completely brown, and presents all the appearances of that of *S. lanestris*. The appendages of the perithecium in "*S. Kusanoi*" are in most cases quite rudimentary or even absent; occasionally, however, they equal or slightly exceed, in length the diameter of the perithecium. The asci are 6–8-spored; the wall becomes thin towards the apex of the ascus (as is shown, *e. g.*, at Fig. 118 of monograph). The complete separation of the inner wall of the perithecium from the outer is a characteristic feature *S. lanestris* (see monograph, p. 75).

Since writing the above, I have received another example of this Japanese *Sphaerotheca* on *Quercus glandulifera*, from Professor Shotaro Hori, collected at Mt. Tsukuba (coll. T. Nishida, Nov. 2, 1900). In this specimen, although the fungus is immature, the mycelium has everywhere taken a decided tinge of brown.

S. lanestris has been known hitherto only from the United States, where it occurs on six species of *Quercus* in the Southern, Middle and Western States. Its occurrence in Japan is of great interest, adding as it does another species to the list of mildews common to North America and Japan (see "Erysiphaceae of Japan" (68, p. 442).

UNCINULA SALICIS (DC.) Wint. (Monograph, p. 81)

Exsicc. add: *Linhart, Fung. hungar. 78; *Rehm, ascomycet. 549b; * Fl. exsicc. austro-hungar. 3177; * Krypt. exsicc. (Mus. Pal. Vind.) 121; Shear, New York Fungi 140 (in herb. Jaczewski).

Distrib. add: Europe ; Bosnia (10).

Hosts, add: Populus suaveolens, Salix gracilistyla, S. multinervis, S. stipularis.

Sredinski (80) has recorded from Russia the occurrence of *U. salicis* on *Hedera Helix.* In all probability, however, the perithecia in this case were merely adhering by means of their appendages to the leaves, as it is most unlikely that the *Hedera* was really serving as a host plant. " *U. salicis* var. *epilobii* Vestergr." on *Epilobium angustifolium* and " *U. Columbiana* Selby on *Scutellaria lateriflora* afford apparently similar cases (*ante*, p. 10).

Brannon (8) has recorded the occurrence in rare cases, of eight spores in the ascus of *U. salicis.*

The haustoria of *U. salicis*, according to the observations of Grant Smith (77), differ in an important manner from those of other species of the Erysiphaceae, being produced not only in the epidermal cells of the host-leaf, but also in the subepidermal (palisade and mesophyll) cells (*ante*, p. 4).

U. MIYABEI Salm. (*U. salicis* var. *Miyabei* Salm. monograph, p. 88)

Hosts, add: Tilia Miqueliana.

From the study of further material, the present fungus, originally described as a variety of *U. salicis*, seems to be worthy of specific rank, the character of the appendages (especially that of the basal part becoming, when mature, thick-walled) separating it clearly from all forms of *U. salicis.* Further, I have not been able to find among numerous specimens of *U. salicis* from Japan. any forms approaching in any way *U. Miyabei*, such as might be expected to occur were the latter only a variety of *U. salicis.* Since its original discovery in Japan on *Alnus incana* and *A. maritima*, *U. Miyabei* has been found at Hokkaido, Prov. Ishikari, Shintotsugawa (coll. T. Hawakami) on *Tilia Miqueliana* see Erysiphaceae of Japan (68), p. 440.

U. ACERIS (DC.) Sacc. (Monograph. p. 90)

Exsicc. add: *Krypt. Exsicc. (Mus. Pal. Vind.) 123 ; *D. Sacc. Myc. Ital. 60 ; *Linh. Fung. hungar. 77, 256.

Distrib. add: Bosnia.

Hosts, add: Acer opulifolium, A. palmatum, A. spicatum Ukuruduense.

In the examination of some *U. aceris* in the conidial stage on *Acer campestre* from Reigate, England, there was observed on all the leaves examined *Oidium*-like conidia much smaller than the normal *Oidium*-conidia with which they were associated. I was not able to ascertain if these smaller conidia which measured about 15 × 7 μ, were organically connected with the mycelium of the *Uncinula*, *i. e.*, whether they were really microconidia, or whether they were merely accidentally present. The presence of some intermixed hyphae of foreign mycelium and loose *Macrosporium* and other spores favor the latter view. The occurrence of these smaller *Oidium*-like conidia among the mycelium of *U. aceris* is of interest in connection with Fuckel's original description of the conidia of *U. Tulasnei* (see monograph, p. 94).

Rabenhorst (59) has recorded *U. aceris* on *Acer monspessulanum* from Boriter in Kurdistan. Specimens so labelled were kindly sent to me by Dr. Hennings from Rabenhorst's herbarium, but these bore only a barren mycelium.

Neger (54, p. 338) states that the conidia of *U. aceris* vary in shape according to external conditions,—to quote his words: "Die Conidien zeigen je nach den Wachsthumsbedingungen (feuchter oder trockener Umgebung) verschiedene Gestalt; in trockener Luft entstandene Sporen sind lang und schlank, während sie in feuchter Umgebung mehr abgerundete und gedrungene Formen zeigen."

U. PRUNASTRI (DC.) Sacc. (Monograph, p. 95)

Distrib. add: Bulgaria (10), Poland (6).

In Spegazzini's herbarium a specimen occurs labelled "*U. Wallrothii f. lonicerae Xylostei*, Belluno, Italy, 10. 8. 78; rarissime." I had already (monograph, p. 97) expressed the opinion that the presence of *U. Prunastri* on the host here given was to be considered only accidental, and an examination of these specimens of Spegazzini shows this view to be correct. We find here that the perithecia—or at least many of them—are fixed upside down by means of the adherence of the mucilaginous apices of the appendages to the leaf of the *Lonicera*. This reversal and reattachment of the perithecium is just what occurs in *U. aceris* (see monograph, p. 92), and has also been observed in several other species of the present genus (*ante*, p. 9).

U. CLANDESTINA (Biv. Bern.) Schroeb. (Monograph, p. 97)

Syn. add: *U. clandestina* Bivon. form. n. *Japonica* P. Henn. Engler's Bot. Jahrb. **29**: 149. 1900.

Hosts, add: *Ulmus parvifolia.*

The "forma *Japonica*" of Hennings (*l. c.*) from Tokyo: Botan. Garten auf lebenden Blättern von *Ulmus campestris* Sm. var. *vulgaris* Pl. (Kusano, no. 155, Oct. 11, 1899) is described as follows: "Die Form ist durch Grössenverhältnisse von der typischen Art etwas unterschieden. Die Perithecien sind 75–85 μ gross mit meist 20 an der Spitze hakenförmig gekrümmten 60–80 μ langen Anhängseln. Die 2–3 Asken jedes Peritheciums sind eiförmig 40–60 x 40–55 μ, mit 2–3 elliptischen 19–25 x 14–18 μ grossen, gelblichen, granulierten Sporen." There are no characters given here of sufficient importance to justify the separation in any way of the Japanese plant from the *U. clandestina* of Europe and Algeria. I have seen several specimens of *U. clandestina* from Japan, and have found them identical with European examples of the species. It may be noted that in Hennings' description, the measurement of the spores is given as "19–25 x 14–18 μ"; in a specimen (now in the Kew Herbarium) sent to me by Dr. Hennings; however, the spores measure up to 30 μ long.

U. NECATOR (Schwein.) Burr. (Monograph, p. 99)

Exsicc. add: Shear, New York Fungi, 141 (in herb. Jaczewski).

Distrib. add: Europe, Germany, N. America, U. S., Georgia (74). S. America, Chili (37).

Hosts, add: *Vitis cordifolia* (84).

The interesting discovery at Geisenheim in Germany of the occurrence of perithecia of *U. necator*—hitherto known in Europe only from France—has been made by Dr. G. Lüstner, who gives (**41**) the following account: "Die von mir aufgefundenen Perithecien wurden an einer an einem Geiztrieb gebildeten Traube, an welcher gleichzeitig auch conidienbildendes Mycel vorhanden war, am 15 November angetroffen; sie sassen an den Beerenstielen in Gruppen beisammen." Dr. Lüstner kindly sent me a microscopic mount of some of the perithecia. These latter, which undoubtedly belong to *U. necator*, are immature, some of the appendages being still uncolored and not yet showing the uncinate apex. The fungus at this stage somewhat resembles *Erysiphe polygoni*—a fact which very probably accounts for the record by Berkeley (Gard. Chron. **21**: 22. 1884, of the occurrence of "*Erysiphe communis*" on vine leaves, from Washington, U. S. A., growing with *U. necator*.

Professor H. O. Juel has informed me that he found in Sept., 1900, at Bonn, Germany, "one leaf of *Vitis vinifera* that was covered with *Oidium*, and had also some well-developed perithecia of *Uncinula spiralis*."

It still seems necessary to assume, however, that *U. necator*, although occasionally producing perithecia in Europe, as a rule survives the winter by means of persistent mycelium or hibernating conidia. (See Wortmann, **88**.)

Pierce (**58***) in his monographic study of the "California Vine Disease," gives a full account of the manner in which *U. necator* attacks the vines of California.

U. MACROSPORA Peck. (Monograph, p. 107)

Exsicc. add: Shear, New York Fungi, 143 (in herb. Jaczewski).

U. CLINTONII Peck. (Monograph, p. 109)

Syn. add: *U. Kusanoi* H. & P. Syd. Mém. Herb. Boiss. **4**: 4. 1900. *U. Zelkowae* P. Henn. Engler's Bot. Jahrb. **29**: 149. 1900.

Exsicc. add: *Rehm, Ascomycet. 1198; Shear, New York Fungi, 142 (in herb. Jaczewski).

Distrib. add: Florida.

Hosts. add: Celtis Sinensis.

As I have pointed out in the "Erysiphaceae of Japan" (**68**, p. 438) *U. Clintonii* is variable as regards the shape of its appendages. These may show a much enlarged clavate apex, often measuring 30 μ across, or the apex is only slightly enlarged, measuring 20 μ across. "*U. Kusanoi* H. & P. Syd." on *Celtis Sinensis* from Japan, has appendages of the latter description, and exactly matches certain examples of *U. Clintonii* on *Tilia Americana* from the United States.

The record of *U. Clintonii* from Florida is based on a specimen sent to Kew from the Florida Agricultural College, Lake City, Fla. (coll. H. H. Hume). It is an interesting form of the species, the perithecia possess few (7–12) rather short appendages, very unequal in length on the same perithecium, and scarcely swollen at the apex.

" *U. Zelkowae* P. Henn." is described (31) as follows: "amphigena; mycelio arachnoideo, tenui, evanescente, albido; peritheciis gregariis, subglobosis, atris, 100–120 μ, appendicibus radiatis, simplicibus ca. 20, hyalinis, apice convolutis usque ad 10 μ incrassatis, 100–200 μ longis, 5–7 μ crassis; ascis (3) ellipsoideis vel subovoideis, 3–4-sporis, 35–50 x 30–40 μ, basi vix stipitatis; sporis ellipsoideis utrinque obtuse rotundatis, 1-guttulatis, hyalinis, 18–22 x 12–15 μ. Tokyo; auf lebenden Blättern von *Zelkowa acuminata* Pl. (Kusano, no. 153, Oct. 1, 1899)." The diagnosis here given shows that the fungus is the same as that sent to me from Kobe, Japan, on *Zelkova acuminata* (*Z. Keaki*), by Professor Kingo Miyabe. This I have described in my monograph, p. 110, and have given there my reasons for considering it only a small form of *U. Clintonii.*

U. POLYCHAETA (Berk. & Curt.) ex Ellis. (Monograph, p. 113)

Syn. add: *U. Shiraiana* P. Henn. Engler's Bot. Jahrb. **29**: 148. 1901.

Distrib. add: S. America, Uruguay, Argentine Republic, Tucuman and Salta (79).

Hosts, add: *Celtis Boliviensis* (79), *C. Selloviana* (61), *C. Sinensis.*

In some examples of this species sent by Spegazzini from Uruguay on *Celtis tala* many of the perithecia attained a diameter of 390 μ, and contained from 150–175 asci each.

" *U. Shiraiana* P. Henn." is a form with 2–4-, or very rarely 5-spored asci. It is not, I consider, distinct from *U. polychaeta* (see "Erysiphaceae of Japan," 68, p. 439). *Phyllactinia corylea,* which usually possesses bisporous asci, shows much the same variation as the present species (see under that species).

U. VERNICIFERAE P. Henn.

U. verniciferae P. Henn., Engler's Bot. Jahrb. **29**: 149. 1900. Salm. Bull. Torrey Club, **27**: 440. 1900.

Distrib.—Japan: Tokyo, Botan. Garten. (Kusano no. 151, Oct. 27, 1899). Prov. Szumo (Tanaka, Nov. 29, 1900).

Hosts.—*Rhus succedanea* (fruit), *R. vernicifera* (leaves).

Hennings (*l. c.*) gives the following diagnosis: "amphigena; maculis fuscis effusis, mycelio arachnoides tenui, albido; peritheciis gregariis subglobosis, atris 100–110 μ; appendiculis 12–16, simplicibus, subulatis interdum apice cirrhatis 100–150 × 6–10 μ, hyalinis; ascis (2–3) ellipsoideis, vel subovoideis vix stipitatis, 8 sporis 40–50 × 35–45 μ; sporis ellipsoideis, utrinque rotundatis, 1 guttulatis, hyalinis, laevibus 17–20 × 9–11 μ. Die Art is mit *U. flexuosa* Peck und *U. aceris* DC. verwandt, durch die viel weniger askenreichen Perithecien u. s. w. verschieden."

Dr. Hennings sent me a specimen of his species (from Tokio), and on this I have remarked ("Erysiphaceae of Japan," **68**, p. 440). "The specimen sent is too immature to enable me to give a full description of the plant. It appears, however, a distinct species, showing affinity with *U. Sengokni* Salm., but differing in the thicker walled appendages, slightly narrowed upwards to the closely coiled frequently helicoid apex."

I have since received from Professor Shotaro Hori an *Uncinula* which proved on examination to be the above species on the fruit of *Rhus succedanea.* The mycelium of the fungus covers the numerous depressions which occur in the fruit of the *Rhus*, and in the specimen sent bears only a few immature perithecia. The appendages are sometimes as few as seven in number; they are not swollen upwards, and terminate in a closely coiled often helicoid apex; towards the base they become refractive and thick-walled.

U. SEPTATA Salm.

U. septata Salm. Journ. Bot. **38**: 427. 1900.

Host.—*Quercus glandulifera.*

Distrib.—Japan: Mt. Myogi, Prov. Kozuké, (Kusano, Nov. 4, 1899, no. 123 (in part); Mt. Tsukuba (T. Nishida, Nov. 2, 1900).

"Hypophyllous: mycelium evanescent; perithecia more or less scattered, large, rounded-lenticular, 160–210 μ in diameter, cells of outer wall of perithecium distinct, small, 5–10 μ wide; appendages crowded, very numerous, 100–170 or more in number, unequal in length (50–100 μ long) on the same perithecium, simple, smooth, 1–8- (usually about 5-) septate, amber-colored in the lower half, thin-walled throughout, about 5 μ wide, apex often helicoid; asci 6–12 (immature). In habit, and in the large size of the perithecia, *U. septata* resembles *U. circinata* Cooke & Peck, from which it is at once distinguished by the septate appendages; from *U. necator* (Schwein.) Burr. and *U. australiana* McAlp.—the only species of the genus at present known which possess colored (septate) appendages—the large perithecia with the crowded appendages at once distinguish the present species. The absence of spores in the ascus shows that the specimens examined are immature; but I have no hesitation in describing the plant in this condition, as the presence of densely crowded septate appendages shows it to be quite distinct from all other species at present known. The appendages when well developed cover more or less completely the upper half of the perithecium—just as is the case in *U. circinata.* Seen in the mass, the appendages are of a pale amber tint; very probably they acquire towards the base, on maturity, a deeper shade of brown, like those of *U. necator.*" Salm. (*l. c.*)

U. septata was first found associated with "*Sphaerotheca Kusanoi* P. Henn., of Shirai," on a leaf of *Quercus glandulifera*, in a specimen sent to me by Dr. Hennings. I have since, through the kindness of Dr. Hennings, been able to look over all the original material of "*S. Kusanoi*," but have not been able to find any perithecia sufficiently ripe to contain spores; I have observed, however, that the appendages are frequently 10-septate. Professor Shotaro Hori has sent me a specimen of *S. lanestris* ("*S. Kusanoi*") or *Quercus glandulifera* from Mt. Tsukuba (coll. T. Nishida, Nov. 2, 1900), and on the leaf a few immature perithecia of *U. septata* occur. It is interesting to find that in this, its second known locality, the present species again occurs associated with the *Sphaerotheca.*

MICROSPHAERA BERBERIDIS (DC.) Lév. (Monograph, p. 123)

Exsicc. add: * Linhart, Fung. hungar. 258.
Distrib. add: Italy.

M. EUONYMI (DC.) Sacc. (Monograph, p. 125)

Exsicc. add: Krieger, Fung. saxon. 1225 (in herb. Jaczewski).

Hosts, add: Caragana frutescens.

In Professor Jaczewski's herbarium there occurs a most interesting mildew on *Caragana frutescens* Medic. from Russia, which with scarcely any doubt must be referred to *M. euonymi.* The fungus forms when mature clinging floccose masses chiefly on the under surface of the leaf; the perithecia measure 100–130 μ in diameter; the appendages are 12–24 in number, 3–5 times the diameter of the perithecium, flaccid and penicillate when mature, with the apex dichotomously branched; asci 4–9, about 60 × 30 μ, 3–5-spored, spores 22–23 × 11–12 μ. The branching of the apex is represented at *Pl. 9, f. 3–5*, and agrees with that found in some forms of *M. euonymi* on *Euonymus Europaeus;* although the apex is perhaps scarcely so much branched as is usual for the species. The type of branching is, however, quite different from that found in *M. Bäumleri* P. Magn., the only other species to which this fungus on *Caragana frutescens* approaches. I have seen only the single Russian specimen mentioned above; and in this, although the perithecia are sufficiently ripe to contain asci with spores, the final branching of the apex of the appendages has not apparently in many cases yet taken place. There is, however, an exact agreement between the branching shown by some of the appendages and that which occurs in some examples of *M. euonymi.* The occurrence of *M. euonymi*, so long known only on *Euonymus*, on another genus of host plants is a notable fact. *M. Caraganae* P. Magn. Bericht. deutsch. bot. Gesellsch. **17**: 150. *pl. 9. f. 1–4.* 1899, on *Caragana arborescens* is in my opinion not a *Microsphaera* at all, but a form of *Erysiphe polygoni* DC. (see monograph, p. 187).

Serbinov (**76**) has lately described from Russia (Gouv. St. Petersburg) a form of *M. euonymi* as a new variety under the name var. *borealis.* I have not seen a specimen of the plant. The following diagnosis is given: "Varietas hypophylla, a *M. euonymi* (DC.) Sacc. mycelio differens persistente, compacto, floccoso, peritheciis gregariis. — Die von mir in einem alten Garten Oranienbaums auf *Euonymus Europaeus* gefundene *M. euonymi* Sacc. hat ein interessantes Mycel. Dasselbe entwickelb sich so kräftig und stark dass ein von ihm befallenes Blatt wie mit Spinngewebe überzogen erscheint. Nach den Angaben von Saccardo ist das Mycel dieses Pilzes *arachnoideus et fugax*, während es bei von mir gefundenen Exemplaren *floccosus* and *persistens* ist. In Folge eines solchen Unterschiedes des von mir gefundenen Pilzes mit der typischen *M. euonymi* Sacc., fasse ich erstere als eine nördliche Varietät auf, und nenne sie *M. euonymi* (DC.) Sacc. var. *borealis* (mihi)."

M. ASTRAGALI (DC.) Trev. (Monograph, p. 127)

Neger (**54**, p. 353) states that in all the mature examples of *M. astragali* which he examined, he found the appendages of neighboring perithecia wound round and so bound together by the hyphae of some secondary fungus, usually *Monilia candida.*

Exsicc. add: Krieg. Fung. saxon. 1222 (in herb. Jaczewski).

Syn. add: Trichocladia astragali (DC.) Neger, Flora, **88**: 351. 1901.

M. ALNI (Wallr.) Salm. (Monograph, p. 129)

Syn. add: M. syringae (Schwein) P. Magn. Bericht. deutsch. bot. Gesellsch. **16**: 67. 1898.

M. Myoschili Neger, Bericht. deutsch. bot. Gesellsch. **17**: Generalversamm.-heft. (241), 1899.

M. Japonica P. Henn. Engler's Bot. Jahrb. **28**: 271. 1900.

Exsicc. add: *Rehm, Ascomycet. 1117, 1299; *Krypt. Exsicc. (Mus. Pal. Vind.), 128; Shear, New York Fungi 144 (*sub M. vaccinii* (Schw.) Cooke & Pk.) in herb. Jaczewski; *Jacz. Kom. Franz. Fung. Ross. exsicc. 337*b* (*sub M. berberidis* (DC.) Lév.).

Hosts, add Berberis vulgaris, Betula pumila (84), *Carpinus Americana* (84), *Chionanthus Virginica, Corylus rostrata Sieboldiana, Ilex verticillata* (84), *Lathyrus palustris, Lonicera hirsuta, L. Sullivantii, Myoschilos oblongum, Quercus discolor, Q. serrata, Styrax Japonicum.*

Distrib. add Europe: Bosnia (10). North America: U. S. A., Florida. South America: Argentine.

Dr. Neger has kindly sent me a specimen (now in the Kew Herbarium) of "*M. Myoschili*" on *Myoschilos oblongum*, from "prope lacum argentinum dictum Quillen in Andibus valdivianis, vulgatissima." The plant shows these characters: perithecia 90–130 μ in diameter, cells of outer wall of perithecium 10–15 μ wide; appendages 5–20, 1–1½ times, or rarely twice, the diameter of the perithecium, becoming thick-walled toward the base when mature, apex 4–6 times regularly dichotomously branched, tips of ultimate branches recurved; asci 4–12, 45–55 × 30–35 μ, spores 3–5, rarely 6. The fungus is, I feel convinced, merely one of the forms of the polymorphous species *M. alni*, with a much-branched apex to the appendages. Quite similar forms are common in the United States on several host-plants, *e g.*, on species of *Quercus* on *Menispermum Canadense*, *Cornus alternifolia*, etc. Occasionally, moreover, in "*M. Myoschili*" the apex of the appendage is only 4 times dichotomously branched, and the fungus is then seen to be identical with the more common form of *M. alni*. In some instances—evidently to be regarded as "sports"—an appendage occurs which forks from near its base into two wide branches, each of which is dichotomously divided at the apex as in a normal appendage. Dr. Neger's figure (*l. c.*, *Pl. 28*, *f. 7*) represents the apex of an appendage in an immature condition—the tips of the ultimate branches (here shown as straight) become revolute at maturity (see *Pl. 9. f. 10*).

In Rehm's Ascomycet., no. 1117, there is a very interesting example of *M. alni*, collected by Professor P. Magnus on *Rhamnus catharticus* at Brandenburg, August, 1893. The apex of the appendage in many of the perithecia is more branched (see *Pl. 9. f. 11*) than is usual for the species in Europe, and exactly corresponds in this respect to certain American forms of *M. alni* on *Quercus*, *Cornus*, etc., which have by some authors been considered as distinct species under the names of *M. pulchra*, *M. quercina*, etc. The branching of the apex of the appendages in this Brandenburg specimen agrees so closely with that found in "*M. Myoschili*" (see above) as to show clearly that the latter must be regarded as merely a form of *M. alni* (*cf. Pl. 9. f. 10, 11*).

A rather remarkable form of *M. alni* has been sent by Professor Kingo Miyabe on *Corylus rostrata* var. *Sieboldiana* from Hakkoda Mountains, Prov. Mutsu, Japan (N. Hiratsuka, August 26, 1897)." Unfortunately the fungus is immature. The specimens are remarkable for possessing appendages which are 2–4-septate and colored below for half their length or more and are often geniculate or irregularly bent. Only one mature apex of the appendages was found and this was identical with that of *M. alni*, being four times dichotomously branched, with the tips of the ultimate branches regularly recurved. The form certainly requires further study. As regards the presence of colored appendages, a similar Japanese form on *Corylus rostrata Mandschurica* has already been noted (monograph, p. 142).

The fungus set out as "*M. berberidis* (DC.) Lév., in foliis vivis *Berberidis vulgaris* L., Petrovsko-Rasumoskoje prope Mosquam, 1899 XI. Legit Serebriaunikov," in Jacz. Kom. Franz. Fung. Ross. exsicc. no. 337*b* is certainly not that species, but *M. alni.* The specimens are immature, and the appendages of most of the perithecia have an undeveloped apex, here and there, however, one may be found in which the apical branching characteristic of *M. alni* has occurred (see *Pl. 9. f. 16, 17*). The occurrence of the present species on *Berberis vulgaris* and the presence of mycelium and young perithecia show that it is undoubtedly growing on this plant is most interesting, as *Berberis* is the usual host-plant of *M. berberidis.*

Freeman's record (**20**) of the occurrence of *M. alni* on *Tilia Americana*, from "Hennepin, Minnesota, U. S. A. (Freeman, no. 58, 1898)" proves to be due to an error, the host plant having been wrongly identified. According to specimens sent to me, the fungus is growing on *Corylus Americana.*

"*M. Japonica* P. Henn." on *Cornus macrophylla*, from Japan, cannot be distinguished from *M. alni* (see "Erysiphaceae of Japan," **68**, p. 439).

M. ALNI LONICERAE (DC.) Salm. (Monograph, p. 142)

Exsicc. add: Krieger Fung. saxon. 1224 (in herb. Jaczewski).

Hosts, add: Syringa vulgaris.

I have had the opportunity, through the kindness of Professor P. Magnus, of examining the specimen of "*M. Ehrenbergii*" (= *M. alni lonicerae*) found by Allescher (see Bericht. botan. Verein. Landshut, 146–152. 1887) on *Syringa vulgaris.* The fungus certainly appears to belong to the present variety. The

Syringa affected stood in close proximity to a bush of *Lonicera Tatarica* attached by the same fungus, so that it would appear that we have here a case of a species of mildew passing directly from one host-plant to another.

M. ALNI DIVARICATA (Wallr.) Salm. (Monograph, p. 146)

Exsicc. add: Krieger, Fung. saxon. 1223 (in herb. Jaczewski).

M. ALNI EXTENSA (Cooke & Peck) Salm. (Monograph, p. 152)

Exsicc. add: Shear, New York Fungi, 146 (*sub M. quercina* (Schw.) Burr. (in herb. Jaczewski).

Hosts, add: Quercus cinerea.

Distrib. add: North America; United States, Florida.

The examples from Lake City, Florida (coll. H. H. Hume), are interesting, as occasionally showing a pale brown color towards the base of the appendages.

M. ALNI LUDENS Salm. (Monograph, p. 154)

Distrib. add: North America; U. S., Helena, Montana (F. D. Kelsey).

Kelsey has recorded (Journ. Mycol. **5**: 83. 1889), the above Montana plant on *Vicia Americana linearis* as "*Erysiphe communis* (Wallr.) Fr." Specimens sent by the author, however, show that the fungus belongs to the present variety of *M. alni.*

M. GROSSULARIAE (Wallr.) Lév. (Monograph, p. 157)

Syn. add: M. sambucicola P. Henn., Engler's Bot. Jahrb. **29**: 148. 1900.

Exsicc. add: Shear, New York Fungi, 145 (in herb. Jaczewski).

Distrib. add: New Zealand (36) (56).

In a "Leaflet for Gardeners," issued by the New Zealand Board of Agriculture (**56**) the present species, which sometimes seriously attacks cultivated gooseberry bushes, is recorded from New Zealand. Bordeaux mixture, or sulphide of potassium (1½ lbs. to 50 gallons of water) is here recommended as a fungicide.

"*M. sambucicola* P. Henn." on *Sambucus racemosa* from Tokyo, Japan, is quite similar to American examples of *M. grossulariae* on *Sambucus racemosa* and *S. Canadensis* (see "Erysiphaceae of Japan" (**68**, p. 439).

M. MOUGEOTII Lév. (Monograph, p. 159)

Distrib. add: Poland (6).

M. DIFFUSA Cooke & Peck. (Monograph, p. 161)

Distrib. add: N. America, U. S., Indiana (84).

M. EUPHORBIAE (Peck) Berk. & Curt. (Monograph, p. 164)

Distrib. add: N. America, U. S., Indiana (84).

M. BÄUMLERI P. Magn. (Monograph, p. 170)

Ref., add: Salm. Journn. Quekett Micr. Club, II. **7** : 371. *pl. 20. f 1–3.* 1900.

Exsicc. add: * Krypt. Exsicc. (Mus. Pal. Vind.) 131 (b, only) *sub Erysiphe pisi.*

Distrib. add: Switzerland, Sweden.

Hosts, add: ? *Lathyrus niger.*

The fungus recorded by Tolf (Bot. Notiser, 1891 : 219) as *Erysiphe Martii* Lév. on *Vicia cassubica* from Småland, Sweden, proves, from specimens communicated to me by the author, to be the present species, which has not previously been known from Sweden.

Jaczewski, in his " Monographie des Erysipheés de la Suisse," 729 (Bull. Herb. Boissier, **4** : 1896), has recorded " *Erysiphe Martii* Lév., on *Vicia* sp., Aug. 29, 1891, herb. Jaczewski no. 76." From a specimen, so labelled, I find the fungus to be *M. Bäumleri*,—a species new to Switzerland.

The fungus recorded by Feltgen (**18**) as " *Erysiphe Martii* Lév. on *Lathyrus niger* proves, from specimens sent (now in the Kew Herbarium) to be a *Microsphaera* in an immature condition. Several appendages were found with the apex once dichotomously branched, and in one case an apex was observed which had forked twice. For the present this fungus on *Lathyrus niger* must be referred doubtfully to *M. Bäumleri.*

(To be concluded)